

7.2 (#63)

$$\begin{array}{cc} 40\% & 65\% \\ (0.4) & x + y = 20 \end{array}$$

$$0.4x + 0.65y = 0.50 \cdot 20$$

$$\begin{array}{r} -0.4x - 0.4y = -8 \\ 0.4x + 0.65y = 10 \\ \hline \end{array}$$

$$0.25y = 2$$

$$y = 8$$

$$x = 12$$

7.1 #71

$$x + y = 20,000$$

$$0.065x + 0.085y = 1600$$

$$- 0.065x - 0.065y = -1300$$

$$0.065x + 0.085y = 1600$$

$$0.02y = 300$$

$$y = 15000$$

$$x = 5,000$$

$$\begin{cases} x - y + 2z = 15 \\ y + 2z = 8 \\ z = 5 \end{cases}$$

Row echelon
Form

$$x - -2 + 2(5) = 15 \quad x = 3$$

$$y + 2(5) = 8 = -2$$

Back substitution

Elementary row
(3) operations

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- ① Switch whole rows
 - ② add any two rows
 - ③ mult. any row by any constant

$$\begin{aligned} 2x - 4y + 6z &= -6 \\ -x + 2y + 4z &= 17 \\ x + 2y - 2z &= 3 \end{aligned}$$

Goal

$$x \ y \ z = c$$

$$y \ z = b$$

$$z = a$$

Gaussian Elimination

$$x + 2y - 2z = 3 \quad \checkmark$$

$$-x + 2y + 4z = 17$$

$$2x - 4y + 6z = -6$$

Switched $R_1 + R_3$

$$\begin{aligned} -2x \quad -4y + 4z &= -6 \\ x + 2y - 2z &= 3 \quad (-2) \end{aligned}$$

$$\Rightarrow \begin{aligned} 4y + 2z &= 20 \quad [R_1 + R_2] \\ 2x - 4y + 6z &= -6 \end{aligned}$$

$$x + 2y - 2z = 3$$

$$4y + 2z = 20$$

$$-8y + 10z = -12 \quad [-2R_1 + R_3]$$

$$x + 2y - 2z = 3 \quad \checkmark$$

$$\begin{aligned} 8y + 4z &= 40 \\ y + \frac{1}{2}z &= 5 \quad \checkmark \end{aligned}$$

$$-8y + 10z = -12$$

$$x + 2y - 2z = 3 \quad \checkmark$$

$$y + \frac{1}{2}z = 5 \quad \checkmark$$

$$14z = 28 \quad [-8R_2 + R_3]$$

$$x + 2y - 2z = 3 \quad \checkmark$$

$$y + \frac{1}{2}z = 5 \quad \checkmark$$

$$z = 2 \quad \checkmark$$

$$\boxed{(-1, 4, 2)}$$

$$\begin{array}{rcl}
 2x + 2y - z = 10 & & -2x + 4y - 2z = 8 \\
 x - 2y + z = -4 & \Rightarrow & x - 2y + z = -4 \\
 -4x + y - 2z = 1 & & 2x + 2y - z = 10 \quad [\text{switch } R_1 + R_2] \\
 & & -4x + y - 2z = 1
 \end{array}$$

$$\begin{array}{rcl}
 4x - 8y + 4z = -16 & & x - 2y + z = -4 \\
 x - 2y + z = -4 & & 6y - 3z = 18 \\
 6y - 3z = 18 \quad [-2R_1 + R_2] \Rightarrow & & 6y - 3z = 18 \\
 -4x + y - 2z = 1 & & -7y + 2z = -15 \quad [4R_1 + R_3]
 \end{array}$$

$$\begin{array}{rcl}
 x - 2y + z = -4 & & x - 2y + z = -4 \\
 7x - 2z = 21 & & y - \frac{1}{2}z = 3 \\
 y - \frac{1}{2}z = 3 \quad [R_2 \div 6] \Rightarrow & & -\frac{3}{2}z = 6 \\
 -7y + 2z = -15 & &
 \end{array}$$

$$\begin{array}{rcl}
 x - 2y + z = -4 & & (2, 1, -4) \\
 y - \frac{1}{2}z = 3 & & \\
 z = -4 & &
 \end{array}$$

Sect. 7.3 #2, 9, 13-16, 37, 40, 77, 78